A CASE STUDY ON COMPARISON OF RETROMUSCULAR PREFASCIAL PLACEMENT OF MESH VERSUS ONLAY MESH PLACEMENT IN REPAIR OF INCISIONAL HERNIAS

A STUDY OF 50 CASES

Dissertation submitted for

Branch – I M.S (General Surgery)

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DECLARATION

I, **Dr. PONCHIDAMBARAM.M** solemnly declare that the dissertation titled "**A CASE STUDY ON COMPARISON OF RETROMUSCULAR PREFASCIAL PLACEMENT OF MESH VERSUS ONLAY MESH PLACEMENT IN REPAIR OF INCISIONAL HERNIAS**" has been prepared by me at Department of Surgery, Madurai Medical College, Madurai, in partial fulfillment of the regulation for the award of **M.S. (GENERAL SURGERY)** degree examination of The Tamil Nadu Dr. M.G.R. Medical University, Chennai to be held in September 2006.

Place: Madurai

Date:

CERTIFICATE

This is to certify that this dissertation entitled **"A CASE STUDY ON COMPARISON OF RETROMUSCULAR PREFASCIAL PLACEMENT OF MESH VERSUS ONLAY MESH PLACEMENT IN REPAIR OF INCISIONAL HERNIAS"** is a bonafide record of work done by **Dr PONCHIDAMBARAM. M**, under my guidance and supervision in the Department of General Surgery, Madurai Medical College, Madurai during the period of his Postgraduate study for M.S. General Surgery from 2003-2006.

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CONTENTS

INTRODUCTION

Incisional hernia, otherwise called as postoperative hernia as described by Ian Arid is a diffuse extrusion of peritoneum and abdominal contents through a weak scar of an operation or accidental wound.

The development of knowledge of aseptic surgery and anaesthesiology and chemotherapy enabled surgeons to enter the peritoneal cavity with increasing safety and led to phenomenal increase in abdominal operations. Incisional hernia is a frequent complication of abdominal surgery constituting about 3% to 11% of laparotomy.

There are various factors responsible, like the patient characteristics and the underlying pathological process and the iatrogenic factors, like technique of wound closure and use of suture material. It usually starts after surgery, as a result of failure of the lines of closure of the abdominal wall following laparotomy. They can incarcerate (6 to 15%), strangulate (2%) or cause skin necrosis and perforation, all of which markedly increase the risk of patient's life. They are also responsible for considerable economic loss to the patient and the family. So these patients have to be operated as early as possible.

Various surgical techniques have been developed for this challenging disease. The use of sheets of non-absorbable synthetic mesh prosthesis placed across the defect and stitched to the abdominal wall has revolutionized the

repair of abdominal wall defects and has rendered the older type of operations obsolete.

Here the emphasis has been laid on the type of prosthetic reinforced repair, choice of prosthetic material, suture selection, wound closure, use of closed suction drainage and preoperative and postoperative care. The available literature on the subject is covered in detail and some of the surgical procedures have been described in detail.

AIM OF THE STUDY

1. To study the etiological factors of incisional hernias.
2. To analyze the preventive measures.
3. To compare and analyze the merits and demerits of retromuscular prefascial mesh and onlay mesh repairs.
4. To study the various complications following the incisional hernia repair.

REVIEW OF LITERATURE

DEFINITION

Incisional hernia is a diffuse extrusion of peritoneum and abdominal contents through a weak surgical scar. A post operative ventral abdominal, or incisional hernia is the result of failure of line of closure of abdominal wall following laparotomy.

INCIDENCE OF INCISIONAL HERNIA

Incisional hernia are variously reported as occurring in 6-12 percent of abdominal surgeries.

SURGICAL ANATOMY OF ANTERIOR ABDOMINAL WALL

The abdominal wall is a complex musculoaponeurotic structure that is attached to the vertebral column posteriorly, the ribs superiorly, and the bones of the pelvis inferiorly. The abdominal wall protects and restrains the abdominal viscera, and its musculature acts indirectly to flex the vertebral column. The integrity of the abdominal wall is essential to the prevention of hernias, whether congenital, acquired, or iatrogenic.

The abdominal wall can be conveniently divided into

1. Antero-lateral wall and
2. Posterior wall

The anterior-lateral abdominal wall is composed of seven layers. From without inwards, they are

1. Skin
2. Subcutaneous tissue
3. Superficial fascia (Scarpa's fascia)
4. Muscles and their aponeurosis
5. Endoabdominal (transversalis) fascia
6. Pre-peritoneal areolar tissue
7. Peritoneum

Skin

The skin in lax and not adherent, except at the linea alba and the umbilicus where it adheres firmly.

Subcutaneous tissue

Contains a layer of soft adipose tissue that generally increases with age. It contains little fibrous connective tissue and affords little strength in closure of abdominal incisions.

Scarpa's fascia

Scarpa's fascia is layer of fibrous connective tissue of modest thickness. The layer affords little strength in wound closure, but its approximation aids considerably in the creation of aesthetic scar.

Muscles and their aponeurosis

Muscles of antero-lateral abdominal wall consists of four large flat muscles and two small muscles.

Flat muscles are:

1. External oblique abdominis
2. Internal oblique abdominis
3. Transversus abdominis
4. Rectus abdominis

Small muscles are:

1. Pyramidalis
2. Cremastric

External oblique abdominis muscle

This is the largest and thickest of flat abdominal muscles.

Origin: Eight fleshy slips from middle of the shaft of lower eight ribs.

Direction of fibres: Downwards, forwards and medially.

Insertion: By a broad aponeurosis through which they are inserted from above downwards into xiphoid process linea alba, pubic symphysis, pubic crest and pectineal line of the pubis.

Lower fibres of the muscle are inserted directly into the anterior two third of the outer lip of iliac crest.

The margin of the part of aponeurosis is a thick band folded internally upon itself to present a grooved upper surface, this is the inguinal ligament.

Internal oblique abdominis muscle

The internal oblique muscle lies beneath the external oblique.

Origin: Lateral two thirds of inguinal ligament.

Anterior two third of intermediate area of iliac crest.

Thoracolumbar fascia.

Direction of fibres: upwards, forwards and medially.

Insertion: Uppermost fibres are inserted directly into the lower three or four ribs and their cartilages.

Greater part of the muscle ends in an aponeurosis through which it is inserted into the seventh, eighth and ninth costal cartilages, the xiphoid process, linea alba, pubic crest and pectineal line of pubis.

Transverses abdominis muscle

This is the smallest of the three flat muscles of the abdomen.

Origin: Lateral two third of inguinal ligament.

Anterior two third of inner lip of iliac crest

Thoracolumbar fascia.

Inner surface of lower six costal cartilages.

Direction of fibres: Horizontally forwards

Insertion: By a broad aponeurosis which is inserted into xiphoid process, linea alba, pubic crest and pectineal line of pubis.

Rectus abdominis and rectus sheath

The recti abdomini are long, broad muscles lying longitudinally in the medial aspect of the abdominal wall. Each arises from the front of the symphysis and the pubic crest, and inserts into the xiphoid process and the cartilages of the fifth to seventh ribs. Each is enclosed in a sheath. Three to five tendinous intersections cross the rectus muscle. They are attached to the anterior portion of the rectus sheath and hence serve to prevent the retraction of the muscle in transverse incision.

Pyramidalis is a small triangular muscle superficial to the rectus muscle, arising from the front of the pubis, and inserting into the linea alba approximately half way between the pubic symphysis and the umbilicus.

Above the arcuate line the posterior rectus sheath is composed of fascia from the posterior lamella of the internal oblique muscle, the transversus abdominis muscle, and transversalis fascia. Anteriorly, the rectus sheath is composed of the external oblique aponeurosis and the anterior lamella of the internal oblique aponeurosis.

Below the arcuate line, which is the point at which the inferior Epigastric artery enters the rectus sheath, the posterior rectus sheath is lacking because the

fasciae of the flat muscles pass anterior to the rectus muscle. The muscle, below the semicircular line, is covered posteriorly by a thin layer of transversalis fascia.

Linea alba

The recti muscles are held close together near the anterior midline by the linea alba. The linea is so called, because it is a white line. The linea alba itself has an elongated triangular shape, and is based at the xiphoid process of the sternum. The linea alba narrows considerably below the umbilicus, so that the medial edge of one rectus muscle may actually overlap the other.

Transversalis fascia

The integrity of the transversalis fascia is absolutely essential for the integrity of the abdominal wall. If this layer is intact, no hernia exists. A hernia infact, be defined as a hole in the endoabdominal fascia or transversalis fascia. This definition applies to oesophageal hiatus hernia, umbilical hernia, inguinal hernia, femoral hernia, and incisional hernia.

Pre-peritoneal connective tissue layer

This layer loosely attaches the abdominal wall with the peritoneum, which can therefore be easily stripped.

Peritoneum

It is the inner most layer of the abdominal wall. The peritoneum provides little strength in wound closure but it affords remarkable protection from infection if it remains unviolated.

Functions of abdominal muscles

1. The abdominal muscles protects and restrains the abdominal viscera, and assists in expelling air during expiration (also faeces, urine or a fetus) mainly due to oblique and transversus muscles.
2. Rotating upper body against the lower body.
3. The paired rectus abdominis muscles are the most effective ones for anterior flexion of the body and are important in rising out of bed and climbing.

Arterial supply

1. The internal mammary artery through the upper rectus abdominus muscle to the upper central abdominal structures.
2. The segmental thoracic and lumbar intercostal arteries from the sides between the external and internal oblique muscles with direct lateral skin perforators.
3. The external iliac artery giving off the deep inferior epigastric artery to the lower rectus abdominis muscle and skin, and the deep circumflex

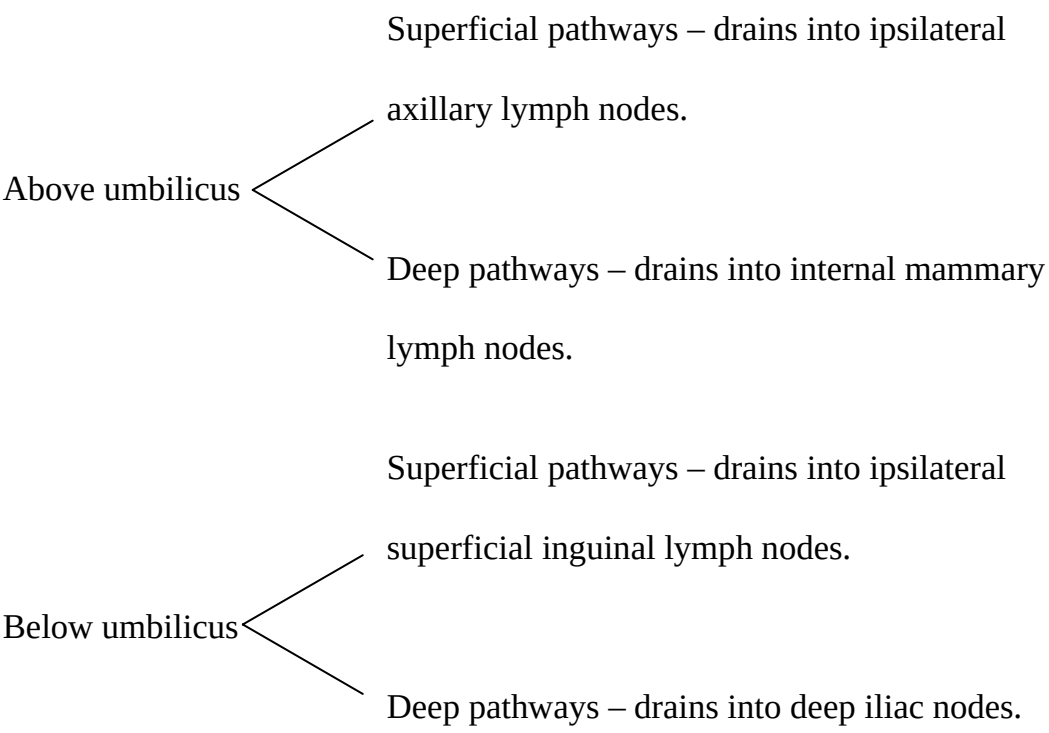
iliac artery supplying the inner aspect of the ileum and terminating in the skin over the iliac crest.

4. The femoral artery giving off the superficial inferior epigastric artery to the lower abdomen and the superficial circumflex iliac artery to the anterior iliac spine area.

Nerve supply

- Anterior rami of thoracic nerves T_7-T_{12}
- Iliohypogastric and ilioinguinal nerves of the anterior abdominal wall.

Lymphatic drainage



ETIOLOGICAL FACTORS FOR INCISIONAL HERNIA

Preoperative factors

Obesity, malnutrition, advanced age, malignant disorders, jaundice, diabetes mellitus, renal disorder, smoking, ACTH and steroid therapy.

Peroperative factors

- Type of operation
- Type of incision
- Suture material used
- Suture techniques
- Use of drainage tube

Postoperative factors

- Wound infection
- Postoperative pulmonary complications and increased intra abdominal pressure
- Collagen abnormalities
- Ageing

PRE-OPERATIVE CAUSES

1. Obesity:

It is associated with high percentage of prospective hernia as well as recurrence following repair of these hernia (3 fold increase) by

- Increased intra abdominal pressure
- Stretches abdominal wall
- Fat is hard to suture, tends to bleed
- Easily breaks down, inhibits wound healing, and raises infection rate

2. Diabetes Mellitus:-

- Decreased inflammatory response
- Increased wound infection rate

3. Smoking:-

- Inactivate antiproteases, so protease and elastase destroy collagen and elastin of rectus sheath and transversalis fascia leading to hernia formation.
- Postoperative atelectasis - Pulmonary infection- Cough – Hernia.

4. Steroid Therapy:-

Inhibit fibroblasts, capillary proliferation and decreases the inflammatory response resulting in impaired formation of granulation tissue leading to incisional hernia.

5. Malnutrition:-

a. Hypoproteinemia

b. Anemia

Delivery of blood and O_2 are inadequate - so poor wound healing.

c. Ascorbic acid deficiency

Inhibition of collagen synthesis leads to abnormal formation of fibers and formation of incisional hernia.

6. Multiple pregnancies:-

There is increased incidence of incisional hernia in multiparous women compared to others.

PER-OPERATIVE CAUSES

1. Nature of Surgery:

Emergency or elective laparotomies for peritonitis, appendicitis, diverticulitis, acute pancreatitis and intestinal obstruction are associated with higher incidence of incisional hernias.

2. Type of Incision:

Mid line incision – 70%

Transverse incision – 12% (If they cross linea alba)

Oblique incision – 12%

(Cholecystectomy, nephrectomy & appendicectomy)

Vertical incision:

Para Median / Lateral paramedian has decreased the number of incisional hernia because of wide shutter mechanism.

Lower midline is associated with more incisional hernia than upper midline incision.

1. Because of the absence of posterior rectus sheath
2. Greater effect of gravity on the lower abdomen.

Pararectus incision:

Divides the intercostal nerves and vessels leading to weakness and increased incidence of hernia formation.

Transverse incision:

Suture closure places suture materials around fascial fibers. On contraction the fibers are opposed and the suture material would realize minimal laterally directed tension.

Oblique incision:

When the intercostals nerves are damaged as in case of sub costal incision and for renal exploration, the muscles atrophy and predispose to hernia formation.

3. Suture Materials:

Mechanism of wound healing is important to know the importance of suture materials and its prevention of incisional hernia.

No tensile strength in the wound during 1st week.

Rapid increase in strength of the wound in 70days after surgery.

Maximum strength of the wound is attained in the first year. The original strength before surgery cannot be attained.

So during early phase of wound healing suture material does, in fact play an important role in maintaining the integrity of the wound closures and there is no role for absorbable suture materials (catgut, polyglactic, acid poly glycolyte) for abdominal wall closure.

Ideal suture material

Non absorbable, monofilament with retention of high tensile strength. Monofilament are inert and doesn't act as a site for infection.

4. Technique of wound closure

a) Mass closure	**Layered closure**
Wide bite a minimum 1cm from the wound edges and placed at an interval of 1cm is ideal	Taking too many sutures lead to strangulation & necrosis compared to mass closure

b) Continuous Vs interrupted

Continuous suture disperses suture tension along the length of incision.

Interrupted sutures – tension is different at each suture that may led to fascial necrosis if tied too tight and poor approximation if tied too loosely.

Length of Suture material:

According to Jeinkes formula for ideal closure of the abdominal wound without tension and risk of wound dehiscence or incisional hernia, the length of suture material should be atleast four times the length of wound (4:1).

5. Hematoma:

It acts as a nidus of infection that in turn increases the incidence of incisional hernia. Dead space drainage and obliteration of dead space prevents any collection which increases wound infection.

6. Wound tension

Wound tension is one of the factor which decides fate of wound healing. Excessive wound tension leads to ischemia and necrosis which predisposes to hernia formation

7. Drainage tube

Abdominal drain through the main wound increases contamination and infection.

POSTOPERATIVE CAUSES

1. Wound infection

It is the most common factor suggested by many authors. It acts by release of collagenases, fibrinolysins, hemolytic and coagulase enzymes.

Bucknall and colleagues in their study found that the presence of wound infection was associated with five fold increase in the rate of developing hernia (23%) compared with uninfected wound (4.5%).

2. Postoperative pulmonary complications

Conditions which increase intra abdominal pressure in the immediate postoperative period like consolidation, pulmonary embolism, obstructive lung diseases and restrictive lung diseases.

3. Collagen abnormalities:

Diseases like Ehler Danlos disease, Marfans syndromes are likely to suffer from multiple hernias and also at multiple sites.

4. Ageing

Ageing and weakness of tissues and the increased intra abdominal pressure associated with chronic cough, constipation and prostatism are proposed etiological factor for the onset of incisional hernia in later age group.

HYPOTHESIS OF INCISIONAL HERNIA FORMATION

URSHEL AND CO

Fascia under stress has increased DNA and protein by fibroblast and these continue for a long time.

Phases of wound healing

1. Substrate phase

1-4 days – Exudative / Inflammatory

2. Fibroblastic phase

5-20 days – Proliferative phase, connective phase, incremental phase

3. Differentiation phase

21st day up to years – remodeling, resorptive or plateau phase.

Possible interruption of the process at a time remote from the apparent healing of wound may lead to fascial weakness.

POLLOCK AND EVANS:

Early fascial separation may be predictive of incisional hernia. Metal clips placed on either side of fascia and abdominal radiography done at 1-month showed that patients who developed incisional hernia post operatively, had demonstrable separation more than 12mm compared to others.

CLINICAL MANIFESTATIONS

Among abdominal wall hernias the incisional hernia is the one to which the patient most frequently alerts the surgeon.

The usual complaint is of a bulge in the vicinity of the healed scar.

If omentum or even preperitoneal fat herniates through small defect, the patient may experience pain and vague discomfort aggravated by coughing and straining.

Generally other symptoms attributable to the incisional hernia are caused either by incarceration of one or several viscera . There is often a history of repeated mild attacks of incomplete obstruction manifesting as colicky pain and vomiting.

Intestinal obstruction may be the presenting complaint in older patients with neglected incisional hernias.

If the hernia strangulates, the symptoms of intestinal obstruction and ischemic bowel will supervene. Blunt trauma to the abdomen may precipitate intestinal injury if the hernia contains incarcerated loops of intestine. In these cases early laparotomy is mandatory (Lancet Editorial 1969)

Rupture of large incisional hernias is uncommon but is encountered occasionally (Hamilton, 1996). In large lower abdominal midline dependent incisional hernias, areas of skin may undergo pressure ischemic necrosis and

may ulcerate and rarely the hernia may rupture and even frank evisceration, may occur.

Past History

Initial operative procedure, complications following initial operations, time of onset of incisional hernia, number of laparotomies and organ operated should be sought for incidences of incisional hernia in different operations.

In Ponka's series of 794 cases of laparotomies, operations on female pelvic organs are the most frequent anticident procedures. It is due to the fact that operations on the female generative tract are so common.

Physical examination

Age – Blomstedt and Bucknell, both noted an increase of hernia in patients over age 60. Incisional hernia is more common in 5^{th}, 6^{th} and 7^{th} decades.

Sex – More in females due to more surgeries on the female generative organs.

Obesity – Incidence of incisional hernia and recurrence rate following repair of incisional hernias are much higher for obese individuals (Bucknell's Study).

Local examination

The size of the hernia itself can be best assesed with the patient standing and coughing, but more important is the size of the defect, which should be

examined with the patient supine. The examiner's hand, with fingers straightened, is inserted into the defect, and the patient is requested to raise his head and shoulders forwards without the aid of his hands.

Complete P/R and P/V examination done to rule out co-existing abdominal pathology.

Diagnosis

The scar of the original operation is always identifiable over the swelling. In a large incisional hernia the diagnosis is obvious.

However, in certain cases, ultrasonography, CT scan or both have been utilized to distinguish hernial defects from other abdominal wall processes that may present as mass lesion or be the source of pain syndrome.

OPERATIVE METHODS OF REPAIR

Three basic methods have emerged for repair of these distressing hernias.

1. Resuture
2. Shoelace darn repair
3. Synthetic nonabsorbable mesh closure

The method chosen depends largely on the size of the hernial defect.

A small defect is one in which the musculoaponeurotic edges come together or almost do so and which is suitable for closure by resutrue.

Hernias with a wider defect also can be conveniently repaired by the shoelace darn technique.

The third method for repair of these hernias involves the use of sheets of woven or knitted mesh of synthetic nonabsorbable materials such as polypropylene, polyester, or sheets of expanded polytetrafluroethylene (ePTFE) placed across the defect and stitched to the abdominal wall. The most common and most favoured material today is knitted polypropylene.

REPAIR BY RESUTURE

The operation is best done with the patient under general anaesthesia with good relaxation. The old scar is excised in an elliptic fashion and is carefully separated from the hernial sac. The skin on each side of the incision

then is further freed to expose the complete sac down to the musculoaponeurotic borders of the hernial defect and part of the abdominal wall beyond it. The sac is opened, and all adherent omentum and loops of bowel are dissected off its inner surface and also of the inner surface of the abdominal wall or a few centimeters on each side of the defect , remembering that it is better to leave bits of sac wall or peritoneum adherent to the wall of the freed bowel rather than to leave bits of the lining scar tissue, and old suture material are excised up to the edge of the hernial defect to expose the normal tissues of the linea alba.

A heavy monofilament polypropylene thread is commonly used. A continuous heavy monofilament polypropylene mass closure is used, taking large bites. The excess skin and subcutaneous tissue is excised, and the wound is closed over the repair with automatic staples or with fine monofilament sutures.

MODIFIED MAYO TECHNIQUE

In which fascia edges were overlapped, typically provided a satisfactory out come.

SHOELACE DARN REPAIR:

In which relaxing incisions are made in the lateral aspect of the anterior rectus sheath. This allows the medial aspect of the anterior sheath to be approximated in the midline and it is especially useful for large upper midline

hernias. This method is based on the fact that strong posterior rectus protect's the potential for hernia formation in the area of relaxing incision.

Next step is to reconstitute the strong new midline which anchor for the flat muscles by reconstructing a new linea alba, which can be done by suturing together a strip of fascia from the medial edge of each anterior rectus sheath. The second step is to restore the recti muscle back to their former length by drawing closer together the lateral cut edges of the anterior rectus sheath where medial strips were split off. This step is accomplished with a continuous suture of heavy monofilament nylon that passes to and fro between the cut edge and that also substitutes functionally and anatomically for missing anterior rectus sheaths.

PROSTHETIC MESH REPAIR

The use of sheets of nonabsorbable synthetic mesh prosthesis placed in abdominal wall defects has revolutionized the repair of incisional hernia and rendered obsolete most of the older types of operations.

CHOICE OF MATERIAL

The ideal is the one that is cheap and universally available, is easily cut to the required shape, is flexible, slightly elastic and pleasant to handle. It must be inert and elicit little tissue reaction and consequently, not rejected, even in the presence of infection. It must be sterlizable and noncarcinogenic.

1. Polypropylene mesh (Prolene, Marlex) meets the requirements of the ideal prosthesis and today it is the most commonly used material for repair of all types of hernia. It consists of a monofilament thread of polypropylene, knitted in a fairly loose manner. For all these reasons, polypropylene knitted mesh has become the standard by which all other prosthetic meshes must be measured.
2. The next most popular prosthesis is also knitted mesh but has a multifilament polyester fiber thread (Dacron, Mersilene). This is an excellent material and cheap. Because of its softness, it easily conforms to all shapes and surfaces without any tendency to recoil. For these reasons, the knitted polyester mesh is particularly suitable for the Rives Stoppa procedure.
3. Another synthetic material available, although less commonly used, is expanded polytetrafluoroethylene (ePTFE, Teflon, Gore–Tex). This material is successfully used for vascular prosthesis.

TYPES OF OPERATIONS

Many variations and combinations of mesh repair have been described.

1. Intraperitoneal mesh

A piece of mesh cut to the shape of defect, but slightly larger, may be sutured in place, deep to the peritoneum.

2. Inlay mesh

A piece of mesh cut to the size and shape of the defect may be sutured as an inlay graft to the edges of the defect.

3. Onlay mesh

A larger piece may be used as an on lay graft on the abdominal wall.

4. Rives-Stoppa technique

An excellent method which has been popular in France for some years now, is the Rives-Stoppa technique of placing the sheet of prosthetic mesh in the place between the posterior rectus sheath and the rectus muscles. This has distinct advantages over the intra peritoneal, inlay or overlay methods.

TECHNIQUE OF ONLAY REPAIR

PRINCIPLES OF REPAIR:

No Tension:

Tension in a hernia repair is the principle factor in failure of wound healing due to the formation of thin scar that does not adequately resist increased intra abdominal pressure.

Bowel should not be exposed to the synthetic mesh:

Synthetic mesh incites an intense inflammatory reaction that mature as dense sheet of scar and if bowel is exposed to prosthesis it becomes densely adherent and predisposes to obstruction.

Antibiotic prophylaxis and preop preparation:

The presence of the prosthesis within a wound disables normal host defense mechanisms that protect against the low level of bacterial contamination that occurs with every surgical wound – to combat this problem inj. Cefotaxime 1gm is administered about 30 min before the skin incision.

Urinary bladder has to be catheterized and Ryles tube has to be introduced.

Most of the cases were operated under spinal anesthesia and the rest under general anesthesia.

Incision

Elliptical incision given excising the previous scar.

Excision of sac:

Skin and subcutaneous flaps dissected and the peritoneal sac defined all around. The peritoneal sac opened and the adhesions present were released. Excess sac was excised and peritoneum closed in the midline with absorble suture materials.

Dissection of flaps:

Skin and the subcutaneous tissues overlying the hernial sac are initially dissected in the plane external to the sac and deep to the subcutaneous fat until the musculo fascial border of the hernia were reached. The dissection is then continued on the surface of the fascia elevating the overlying skin and fat to a length of 5-8 cm from the margins of the hernial orifice.

Midline defect in rectus sheath closed with no.1 prolene suture material by continuous manner without tension.

Placing of prosthesis

Polypropylene, monofilament knitted mesh about 15 x 15 cms used for repair is kept over the sheath without tension and excessive folding.

Fixation of mesh

After placing the mesh over the rectus sheath, it is fixed using 2-0 prolene around 1cm form its edge with the rectus sheath. Two closed suction drains are placed over the mesh and fixed with the skin. Paniculectomy is done in patients with excessive subcutaneous fat.

Postoperative period

- Oral fluids started after return of bowel movements
- Catheter removed on first postoperative day and mobilization of the patient done on the same day.
- Serial recording of the drainage done and suction kept until the drainage collection is nil.

Suture removal done usually on the 10^{th} day and if wound found healthy patients were sent home and the average duration of stay was 10 days.

TECHNIQUE OF RETROMUSCULAR PREFASCIAL PLACEMENT OF MESH

In this technique mesh is placed in the plane behind the rectus muscles and laid onto the anterior aspect of the posterior rectus sheaths.

Steps:

1. The rectus muscles are separated form the posterior rectus sheaths up to the whole length of the lateral edge of the sheath.
2. Sheet of knitted, braided polyester fiber (Mersilene, Dacron) cut longer than the length of the defect and wide enough to stretch from one lateral edge of the rectus sheath to the other.
3. It lies on the closed peritoneum and posterior rectus sheaths and will stretch above and below the defect and also from one lateral edge of the rectus sheath to the other , and in the plane behind the rectus muscles.
4. The sutures are passed through the lateral edges of the rectus sheath (linea semilunaris), from outside the sheath, and then along the edge of the mesh and knot placed superficial to rectus sheath.
5. When the hernial defect reaches the upper part of abdominal wall, upper edge of mesh is passed down to lie under the diaphragm.

6. In lower abdomen below the arcuate line, it lies in the preperitoneal plane and should be long enough to be laid into the pelvis, and fixed back to pubis, and along the pectenial lines.
7. Two vacuum drains are laid on the graft and brought out. The anterior rectus sheaths are then sutured together along their cut medial edges with non absorbable monofilament suture.

Advantages

1. Graft is held in place by the natural forces of the intra abdominal pressure against the abdominal wall.
2. Avoids slippage and recurrent hernia between graft and edge of the detect.

Studies

1. Open Rives – Stoppa ventral hernia repair.

Heartstill L, Richards ML et al

Department of surgery, university of Texas health science center at San Antonio.

Study – 81 patients were taken up for Rives – Stoppa repair of whom

54% were recurrent

37% were incarcerated

42% had multiple defects

Follow up : Average 30 months

Conclusion : Recurrence rate 10%

No correlation between hernia recurrence and

- Age
- Gender
- BMI
- Hernia size
- No.of prior repair

2. Comparison of repair techniques for major incisional hernias

Demanian GA, Denham W

Department of plastic surgery, Department of surgery. IL

Conclusion: No one technique is the “best” procedure for all patients.

3. Rives-Stoppa procedure for repair of large incisional hernias:

Bauk JJ, Harrin MT et al

Department of surgery, Mt Sinai School of Medicine, Mt Sinai Hospital, New York.

Study: 57 patients for 6 year period of whom 15 were recurrent.

Follow up : 34.9 months

Results : No recurrences, GI complications, fistula or death.

2 patients had wound infections

Conclusion : It gives excellent long term results and minimum morbidity.

MARLEX PERITONEAL SANDWICH

Sheet of polypropylene mesh is implanted between two layers of host tissues like a sandwich. This is done by splitting open the hernial sac and scar tissues vertically in the midline, and freeing all adherent bowel and omentum form the inner surface. The cut edge of one flap then is sutured to the medial edge of the opposite rectus sheath to close the abdominal cavity. The sheet of mesh is laid down on the anterior surface of this flap and each edge is sutured to medial edge of the rectus sheath on its ipsilateral side.

The mesh then is covered by the second half of the sac, the cut edge of which is sutured to the medial edge of the opposite rectus sheath.

Disadvantages

This procedure is time consuming and doesn’t reconstruct the normal anatomy and functional elements of the abdominal wall.

LAPAROSCOPIC INCISIONAL HERNIA REPAIR

Abdomen is entered through an area away form the hernia by means of one of the two techniques, closed or by open method. Adhesions are released to free anterior abdominal wall.

Margins of hernia are delineated and cleared circumferentially, about a distance of atleast 4cm. Hernial sac contents reduced, peritoneal sac itself was

left in situ, ePTFE mesh tailored to overlap all hernia's by a margin of 3cm to 4cm and introduced through 10mm trocar site and positioned.

PROBLEMS OF MESH IN VIVO

I. SHRINKING OF POLYPROPYLENE MESH

Mesh that contains a lot of polypropylene content have a tendency to shrink post operatively so that is requires at least 3cm overlap from the hernial defect to prevent recurrence.

II. FIXATION OF MESH

Herniation pressure, hydroxylproline concentration, mesh shape and number of fibroblasts, collagen fibers of tissue all act as an anchor zone. But ideal and accepted method is fixation of mesh with non- absorbable sutures with 1cm gap between two sutures.

III. PREVENTION OF ADHESION

Prevention of adhesion formation with sodium hyaluronate based bioresorbable membrane.

Mesh repair has now eliminated the need for

Relaxing incision

Musculo fascial flaps

POSTOPERATIVE MANAGEMENT AND POSTOPERATIVE COMPLICATIONS

Post operative management

The ambulation will be started on the evening of the operation and breathing exercises started. Nasogastric tube and intravenous infusion can be removed on the next morning and the patient is encouraged to walk and to eat and drink normally. Active movements of the chest and limbs are encouraged from the beginning.

Body temperature is monitored. Persistent fever beyond 4^{th} P.O.D indicates suppuration.

Drainage tubes can be removed after 3-5 days. This depends on the amount of discharge and degree of obesity of the patient. Sutures are left preferably upto 10-15 days.

If the patient is an office worker , he can return to work at any time he feels comfortable. Patients are advised to avoid unusually excessive physical effort for 3 to 6 months. Sexual intercourse should be abstained for a month or more after operation.

POSTOPERATIVE COMPLICATIONS

A. IMMEDIATE COMPLICATIONS

I. GENERAL COMPLICATIONS

1. Mortality:

0.6 – 1.2%: It is usually due to respiratory failure and associated cardiac illness**.**

2. Gastrointestinal complications - paralytic ileus:

Ileus may result after repair of large incisional hernia due to mobilization and excessive handling of intestines. Increased stress upon a healing wound may result in recurrence of hernia. When there is a postoperative distention and paralytic ileus, gastric aspiration and intravenous fluids are necessary.

If the patient is nauseated, he should have nothing by mouth until nausea ceases. Often on the third postoperative day in the uncomplicated case, to avoid excessive straining at defaecation, it is necessary to give a mild purgative.

3. Pulmonary complications: 1%

Respiratory tract diseases places increased stress on the suture line by increasing the intra- abdominal pressure. Allergic conditions causing coughing or sneezing should be properly treated. These complications can be prevented by providing respiratory therapy for 12 –24 hours or even longer.

4. Urinary Complications

After operations on lower abdominal incisional hernias, often the patient will have retention of urine. Catheterization of the bladder with an indwelling Foley's catheter obviates these complications.

5. Thrombophlebitis: 1%

When the contents of the massive hernial sac are reduced into the abdominal cavity, the increase in intra- abdominal pressure causes venous hypertension in the lower extremities, presumably with an increase in incidence of deep vein thrombosis in lower extremities. This can be prevented by low doses of anticoagulant therapy continued until the patient can walk and is ready for discharge. Active limb movements in early postoperative period is also helpful.

II. LOCAL COMPLICATIONS

1. Seroma

The development of a chronic seroma is a common complication. A recurring accumulation of serum in the abdominal wall usually calls for repeated needle aspirations and the external application of mild pressure.

2. Haematoma : 4.5%

Small haematomas need not be disturbed. But the blood outside the vascular system is a type of necrotic or dead tissue. So, any large haematoma should be debrided or evacuated as in any other devitalized tissue.

3. Wound Infections

a. Minor infections 5.1%

These are superficial infections associated with minor skin loss at the margins of the wound.

b. Major infections 0.75%

These are suppurations, which occur in the depth of the wounds. These patients will be ill with fever and chills and leukocytosis accompany the onset of infection. Drainage of the wound is essential. Culture and sensitivity should be obtained. Antibiotic irrigation may be used. Systemic antibiotics are essential.

c. Cutaneous gangrene 1.2%

4. Wound induration

When mesh is used, a small number of patients will have pain and induration in the operated area. Reassurance and analgesics are helpful. The pain usually diminishes.

5. Abdominal wall sinuses

As a result of infection in wounds containing foreign bodies, persistent draining sinuses are frequent. The sinuses may be due to infection in sutures or infections in sheets of implanted materials. Many draining sinuses will respond to drainage, irrigation, compression and antibiotic therapy.

Jacobs and colleagues, (1965) reported an infection rate of 20% and seroma in 45 patients who underwent mesh repair for incisional hernia. This is higher than the Usher reports of 6.3%.

In employing Teflon mesh for the repair of 25 incisional hernias, Gibson and Stafford (quoted by R.S. Smith, 1971) had a 50% incidence of wound complications. In more than 2000 incisional hernia repairs, by Preston and Richards (1963) the incidence of infection was 0.1.

B. LATE COMPLICATIONS

1. RECURRENCE

Herniorhaphy as a planned procedure may be carried out in patients above 70 years with minimum morbidity and mortality.

In Larson's series of 53 patients with prosthetic incisional hernia repair, removal was not necessary. Hamilton used free fascia lata patches to repair 47 large or different hernias (43 incisional and 4 groin) over a 21 years period. In this group there were 3 recurrences.

R.S. Smith used Tantalum mesh for hernia repairs. He noted 12 recurrences in Tantalum mesh and 1 recurrence in Marlex mesh group.

In M.J. Notras (1974) series of 32 prosthetic repairs of incisional hernia, there were no recurrences.

Recurrence rate for the repair of incisional hernia

Author	Types of repair	No. of cases	Recurrence	Percentage
Rodney Maingot	Keel repair	115	5	4.3
Abroahamson	Shoelace repair	300	6	2.0
Adloff and Arnaud	Mersilene mesh intraperitoneal	130	6	4.5
Usher	Two layer Marlex	96	10	10.4

2. Late infection

It largely depends on the type of prosthetic material used.

3. Recurrent seromas

There are multilocular cystic masses on the site of treatment of larger incisional hernias. They appear more frequently after placement of onlay prosthesis. It requires further surgery for excision of seroma.

4. Digestive migrations

These occur more often after the placements of prosthesis in intra abdominal site. It is intra luminal migration of prosthesis. They must be differentiated from intestinal fistulas occurring following incisional hernia repair using prosthetic material, with suppuration and postoperative disunion.

PROSTHETIC MATERIALS FOR INCISIONAL HERNIA REPAIR

HISTORICAL DEVELOPMENT

Biomaterials are some times required to bridge or reinforce natural and unnatural defects over abdominal wall, inguinal canal and also chest wall.

They may easily be classified into;

a. Natural prosthetic biomaterials
b. Metallic synthetic biomaterials
c. Nonmetallic synthetic prosthesis

PROSTHETIC NATURAL BIOMATERIALS

- Autogenous dermal grafts
- Dermal Collagen Homografts
- Autogenous fascial heterografts
- Preserved dural homografts
- Whole skin grafts
- Porcine dermal collagen
- Lyophilized aortic homografts
- Bovine pericardium

Some of these were used with fairly successful results, but their scarcity and in many cases, cost, limited its use.

METALLIC SYNTHETIC BIOMATERIALS

Use of metallic synthetic biomaterials predated development of natural implants.

- Silver filigree
- Tantalum gauge mesh
- Stainless steel mesh

But these were difficult to fondle in surgery and were associated with poor resistance to infection leading to frequent abscess formation and recurrent herniation.

1. Silver Filigree

Lack of pliability, tendency to become hardened by work, accumulation of fluid around the material, wound infection and the subsequent sinus tract prevents its use in management of hernia.

NON METALLIC SYNTHETIC PROSTHESIS

i) Nylon mesh

ii) Silastic

iii) Polytetra fluroethylene

iv) Carbon fiber

a. Nylon mesh

Unreliable in infection, has poor fibroblast ingrowth loses its strength due to hydrolysis and chemical denaturing in vivo.

b. Silastic

Mainly used in pediatric repair of omphalocele and gastrochisis. Adequate fibrous tissue ingrowth was one of its advantages.

c. Polytetra fluroethylene

Not incorporated well into body tissue and not tolerant to infection.

d. Carbon fiber

Advantages include biocompatibility and formation of new connective tissue similar to ligament.

CURRENT SYNTHETIC BIOMATERIALS

a. Polyester mesh
b. Polypropylene mesh
c. Expanded polytetra fluro ethylene mesh

Ideal characteristics of synthetic biomaterials

- No physical modification by tissue fluids
- Chemically inert
- Does not incite intense inflammatory (or) foreign body reaction
- Hypersensitivity
- Non carcinogenic

- Can be fabricated to any form or shape without loss of its strength
- Resistance to mechanical strains
- Can be sterilized by auto claving or disinfectants

POLYESTER MESH (Dacron, Mersilene)

These prostheses are supple and elastic, conform to visceral space, have a grainy texture to grip the peritoneum and prevent slippage, and are sufficiently reactive to induce rapid fibroblast response to ensure fixation.

POLYPROPYLENE MESH (marlex, proline)

Usher and co in 1958 introduced polypropylene mesh in incisional hernia.

The advantages are:

- In purulent infection, granulation tissue grow through the mesh without sloughing or sinus tract formation.
- Inhibit bacterial entrapment
- Tensile strength retained indefinitely
- Soft, pliable and easy to handle
- Can be autoclaved, trimmed in operating room
- Interstices allow for prompt fixation by collagen .

Because of the above nature, polypropylene mesh is the most commonly used prosthesis in incisional hernias.

Disadvantages

Mesh when placed close to bowel can lead to

i. Fistula formation – mesh when in contact with bowel may erode into adjacent bowel and leads to formation of enterocutaneous fistula.

ii. Obstruction

EXPANDED POLYTETRA FLURO ETHYLENE

i. Minimal inflammatory reaction occurred with ePTFE.

ii. It can be placed safely over the bowel without formation of fistula, and obstruction are rare.

iii. Orderly orientation of scar tissue adjacent to the patch.

MATERIALS AND METHODS

The materials for this prospective study of the dissertation were carried out for 50 patients who were admitted in the General Surgical wards at Government Rajaji Hospital, Madurai Medical College, Madurai during the period of August 2003 to March 2006. The study comprised of 47 females and 3 males forming a total of 50 patients.

A detailed history has been made and thorough general examination was made and cases were studied as per the proforma attached.

Routine lab investigations of urine and blood and chest screening and ECG were done.

The other things were noted as:

- Type of incision and suture materials used
- Postoperative healing of wound
- Size of detect
- Presence of other predisposing factors like obesity

Poly propylene mesh was used in all 50 cases. The patients were followed up for a maximum of 2 ½ years and minimum of 4 months. Of the 50 cases 22 patients underwent retromuscular prefascial mesh placement and 28 patients underwent onlay mesh graft.

OBSERVATIONS IN OUR STUDY

Table I

Weight of the patient and occurrence of incisional hernia

Weight range	Number of patients	Percentage
40-50 kg	16	32
51-60kg	26	52
61-70kg	8	16

Majority of the patients were in the weight range of 50-60 kgs.

TABLE II

Sex Incidence

Sex	Number of cases	Percentage
Male	3	6
Female	47	94

The incidence is more in the female cases than male.

TABLE III

Age Distribution

Age group	Number of patients	Percentage
<20 years	1	2
21-30 years	18	36
31-40 years	15	30
41-50 years	9	18
>50 years	7	14

Maximum incidence occurs in the age of 21- 30 years.

TABLE IV

Type of incisions

Types of surgery	Type of incision	No. of patients	Percentage
Obstetric cases	Lower vertical incision	47	94
Duodenal ulcer perforation closure	Upper midline	1	2
Appendicectomy	Gridiron	2	4

Forty seven patients (94%) had lower vertical incisions in obstetric cases.

TABLE V

Nature of surgery

Type of surgery	Number of patients	Percentage
OBSTETRIC SURGERY	47	94
Hysterectomy	4	8
Caesarean	43	86
NON OBSTETRIC SURGERY	3	6
Appendicectomy	2	4
Duodenal perforation closure	1	2

Majority of patients forty seven of them (94%) underwent surgery for obstetric reasons and three (6%) patients for non obstetric reasons.

Presenting complaints

In our study all the 50 patients had bulge. Pain occurred in 22 patients. Skin changes occurred in 1 patient.

Associated diseases

Ten patients were diabetic at the time of surgery.

Three patients were hypertensive at the time of surgery.

Diameter of the scar

Up to 5cm - 41 patients

5<10 cms - 9 patients

All cases were subject to routine biochemical and hematological investigations. Radiological investigations including ultrasound were carried out in all cases. Pulmonary function tests were carried out in selected cases who had previous history of bronchial asthma and respiratory disorder.

Complications such as intestinal obstruction and gangrene of small bowel loops were not taken in our case study.

Method of repair

In our study of 50 cases of incisional hernia, 22 patients underwent retromuscular prefascial mesh placement while 28 patients underwent onlay mesh graft.

TABLE VI

Peroperative complications

	Prefascial placement		**Onlay mesh**	
	No. of patients	**Percentage**	**No. of patient**	**Percentage**
Haemorrhage	6	27	3	11

Incidence of haemorrhage is more common with prefascial mesh compared to onlay mesh.

TABLE VII

Early postoperative complication

	Prefascial placement		Onlay mesh	
	No. of patients	**Percentage**	**No. of patients**	**Percentage**
Respiratory complications	-	-	1	3.5
Post operative ileus	2	9	1	3.5
Hematoma	1	4.5	-	-
DVT with pulmonary embolism	-	-	-	-
Superficial sepsis	2	9	6	21
Deep sepsis	1	4.5	7	25

Incidence of wound infection is more common with onlay mesh compared to prefascial mesh.

TABLE VIII

Late postoperative complications

	Prefascial placement		Onlay mesh	
	No. of patients	**Percentage**	**No. of patient**	**Percentage**
Recurrence	-	-	1	3.5

Incidence of recurrence is more common with onlay mesh compared to prefascial mesh.

DISCUSSION

Incisional hernia is due to loss of continuity of fascial closure. It is one of the major complications of laparotomy with an incidence of about 3-11%. There are so many etiological factors for incisional hernia and they should be repaired as soon as they are diagnosed to reduce the complications and reduce the recurrence rate.

After the advent of mesh repair the other procedures have become obsolete. Though it is associated with increased incidence of local complications, it reduces the recurrence rate.

The rationale behind using mesh repair invariably for all cases independent of size of defect, age, sex and weight of patient was to reduce the incidence of recurrence rate.

ONLAY MESH REPAIR:

Onlay mesh repair was done in preference to other procedures because of the following reasons:

Onlay is technically simple and easy procedure compared to others.

No need to dissect in complex areas like preperitoneal and behind the rectus, which leads to hematoma formation and predisposes to wound infection.

Complications like obstruction due to adhesion formation and fistula formation are rare compared to other procedures.

RETROMUSCULAR PREFASCIAL MESH REPAIR

It is an excellent method (Rives-Stoppa technique) by placing the sheet of prosthetic mesh in the plane between the posterior rectus sheath and the rectus muscles. This has distinct advantages over the intraperitoneal, inlay or overlay methods.

Though it is technically difficult with the higher rate of haemorrhage it has the distinct advantage of reducing the rate of infection and recurrence.

Study

Comparison of study patients with other study groups revealed the following information.

- In Ellis group of study, obesity was associated with three fold increase in herniation and recurrence. But in our study majority of patients 52% belong to the 51-60kg.
- In our study 94% of surgeries were for obstetric cases. In NEJM 2000 it is less than 25% and majority underwent gastrointestinal surgery.
- Wound infection rate in our study is 16% compared to 4% in Yossef Hadchity study (Arch surg 1999, 134). Even in the presence of wound infection-all the patients except one were treated conservatively.

- The cause of incisional hernia in our study group is due to the wound infection and second due to the poor surgical techniques, during closure of abdominal wall after caesarean section and third cause is multiple surgeries.
- There was one recurrence of incisional hernia after onlay mesh repair in our study group.

On the basis of our experience and reports in the literature, the advantage and disadvantages of onlay and prefascial mesh repair has been discussed.

CONCLUSION

1. In our group 94% (47) of incisional hernia was due to previous obstetric surgery and majority of them are lower vertical incisions
2. Using non-absorbable monofilament suture materials for closure of abdomen in mass closure technique can reduce incisional hernia incidence.
3. Using of mesh repair has drastically reduced the rate of recurrence almost to nil in our study patients.
4. Per-operative haemorrhage was seen in 18% (9) of patients. Of these 6 patients had prefascial mesh placement and 3 patients had onlay mesh.
5. Wound infection rate is about 16% (8) in our patients. 7 patients had onlay mesh and 1 patient had prefascial mesh placement.
6. Recurrence was seen in 2% (1) of patients, who had undergone onlay mesh repair.

Mesh repair has become the standard for the repair of all incisional hernias.

Among the various techniques described in the mesh placement, onlay repair, though technically easier and associated with the lower incidence of haemorrhage, is complicated by a higher rate of sepsis and recurrence.

Prefascial mesh repair, though technically difficult for the novice, plagued with a higher rate of haemorrhage has the distinct advantage of reducing the rate of infection and recurrence.

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P

PROFORMA

Name: Age: Sex:

Weight: Para 2 3 4 5

Occupation – Domestic

Labourer

Heavy labourer

History of present illness:

Hernia – First

Recurrence

Pre operation weight reduction advised – Yes

No

If, Yes , How long?

How Much?

H/o Pul. Tuberculosis

Br. asthma

Previous surgery - Nature of Surgery

- Nature of Anaesthesia
- Suture material used
- Time interval between surgery & hernia

H/o. Previous wound healing

Normal

Mild sepsis

Severe sepsis

Wound dehiscence

Burst abdomen

Known diabetic patient

Tuberculosis patient

No.of previous operation done

Symptoms

Swelling

Pain - Abdomen

Distension

Bowl habits - Constipation

Vomiting

Personal history

Diet

Smoking

Alcoholism

Menstrual history (in women)

Family history – No. of children and their condition (for women)

G/E: a) Built

b) Anemia

c) Edema feet

d) Any other deficiency disease

e) Overall look – Healthy , Fair, III health

L/E: Abd. Flat

Protuberant

Pot belly

Site of Hernia Midline

Lateral

Previous incision URPM, ULPM, LRPM, LLPM,

Upper midline

Lower midline

Transverse incision

Oblique incision

Skin over the Hernia Normal

Unhealthy

Thinned out & pappery

Hyperpigmented

Ulceration

Hernia reduces during lying down

Cough impulse present / absent

VIP - Present

Absent

Tenderness - Present

Absent

Size of the hernial sac - < 5cm

5-10 cm

more than 10 cm

Size of the defect - < 5cm

5-10 cm

more than 10 cm

H/O suggestive of intestinal obstruction

Pain abd.

Vomiting

Constipation

Percussion - Swelling resonant or dull

Auscultation - Over the swelling peristaltic sounds heard or not

Examination of tone of abdominal muscle

INVESTIGATIONS

Routine blood investigations -

ECG -

CXR -

USG Abd. –

Anaesthesia : GA Spinal Epidural

Incision

Size of the opening

Sac – thin

thick

Adhesions - With omentum

With bowel

Mild

Extensive

Omentectomy – Yes

No

Nature of Recti - Normal

Thinned out widely separated

Type of surgery

Retromuscular Prefascial mesh repair

Onlay mesh repair

Suture material

Prolene

Prosthesis used : Polyproplyene

Technical difficulty : Bleeding / Raising flaps / Closure

P/O Bladder catheterized: Yes How long?

No

Rylestube aspiration Yes How long?

No

Drainage tube - Corrugated Rubber Drain

Romovac

POST OPERATIVE PERIOD

General complications

Local complications

1. Pain
2. Hamatoma
3. Seroma
4. Wound infection Nil mild Severe Wound dehiscence

Sutures removed on 8^{th} day 10^{th} day 12^{th} day

Discharge notes:

- Date
- Condition of patient
- Advice
  - Diet

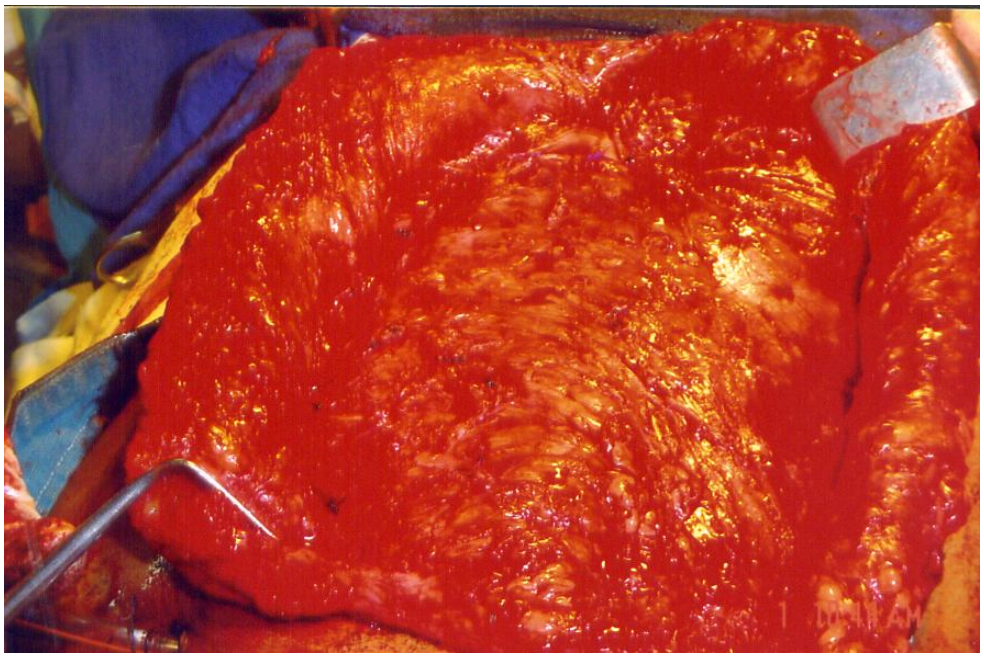
- Nature of operation
- Change of occupation, if any

Follow up

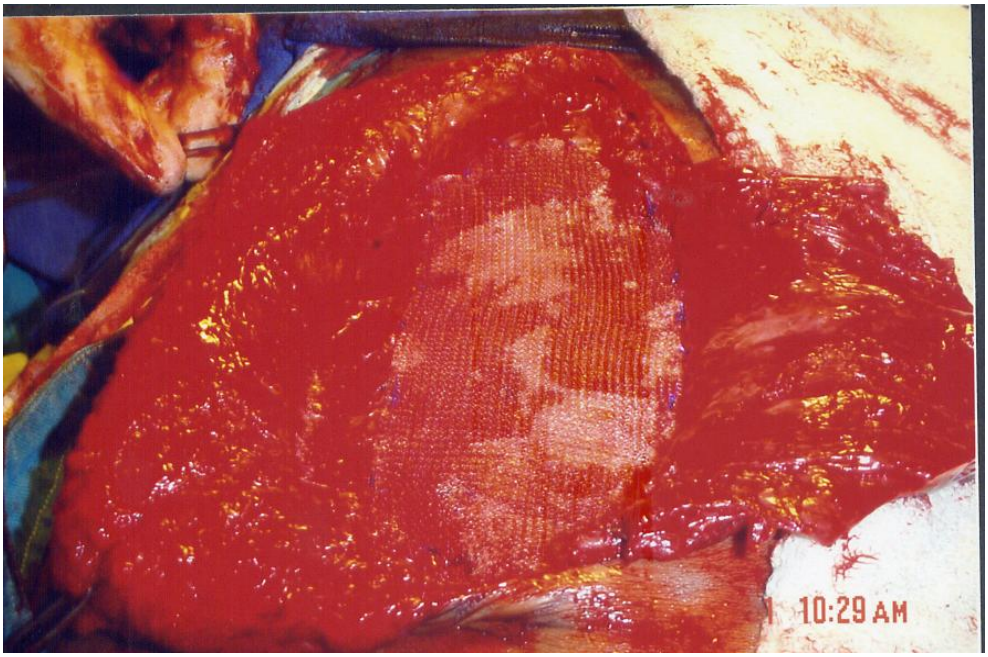
- General condition
- Bowel habits
- Cough
- Recurrence of hernia
- Any complication

INCISIONAL HERNIA THROUGH LSCS SCAR

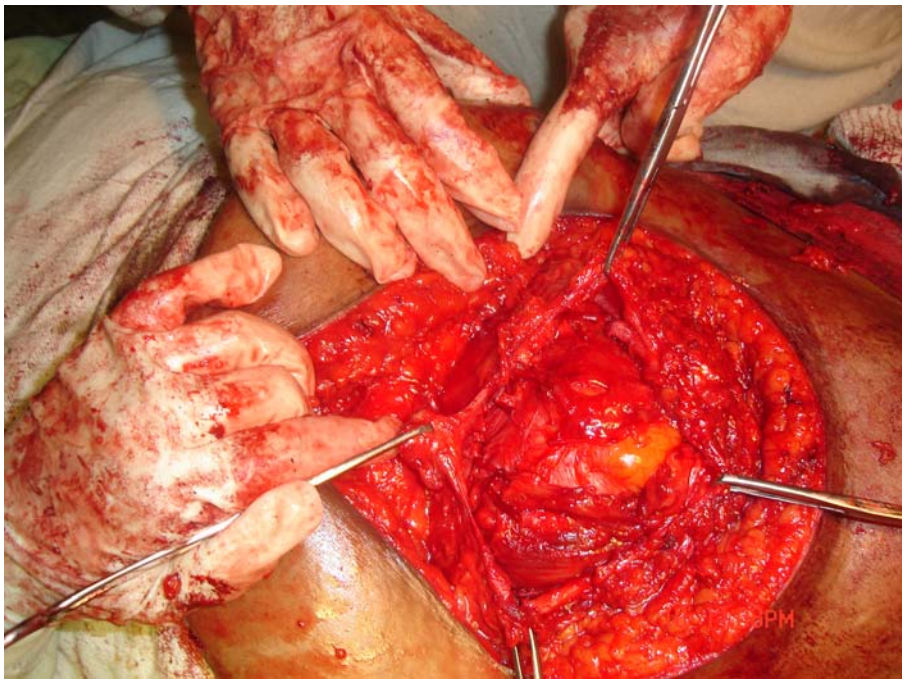
SAC BEING DISSECTED AND FLAPS ARE RAISED



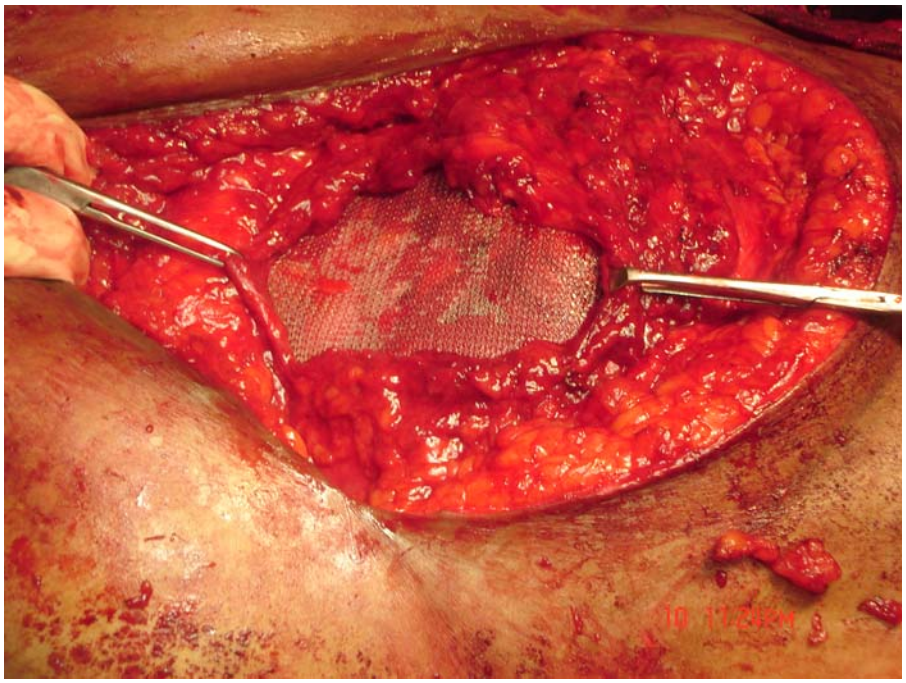
ONLAY MESH BEING FIXED

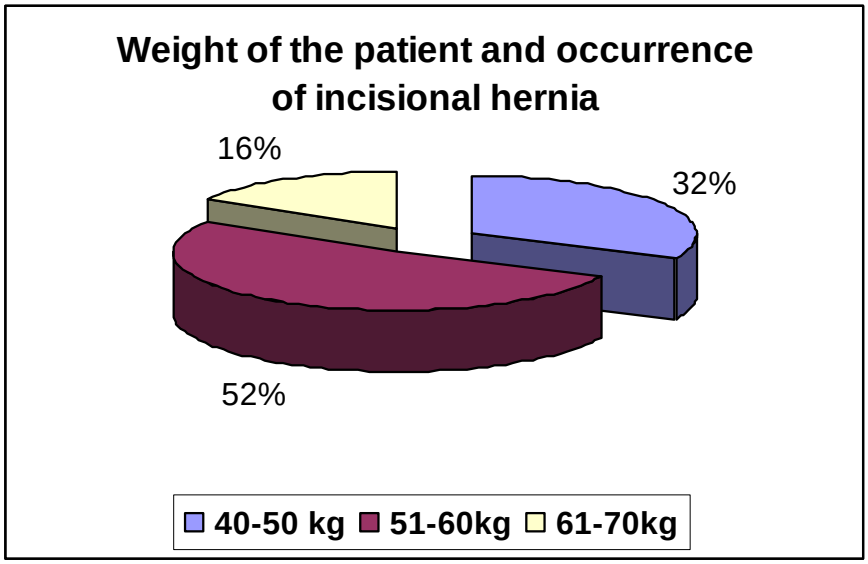


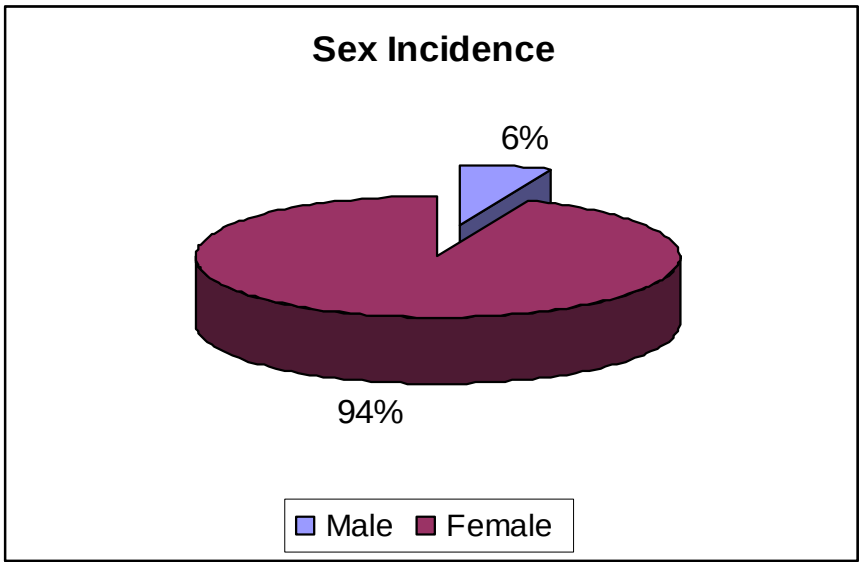
PERITONEAL SAC BEING DISSECTED

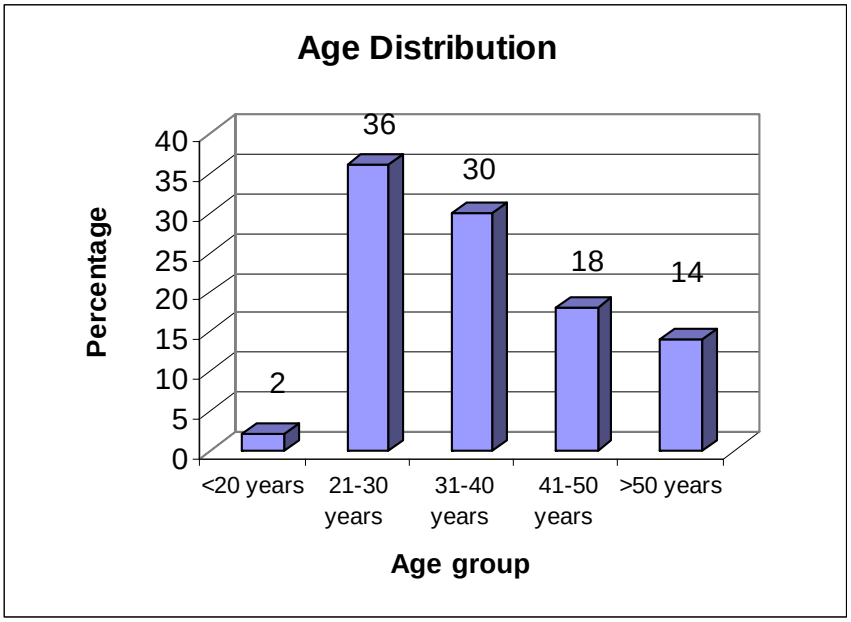


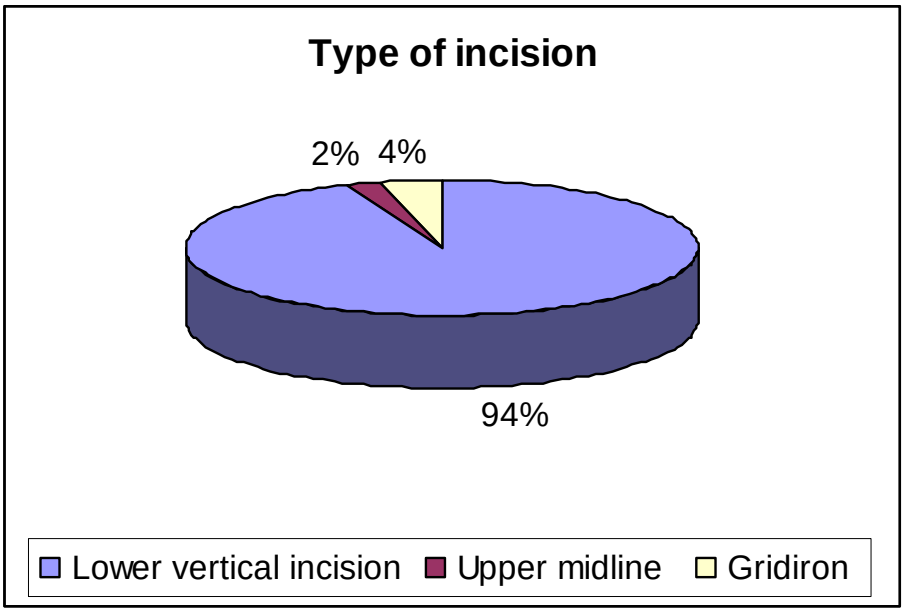
RETROMUSCULAR PREFASCIAL MESH BEING PLACED

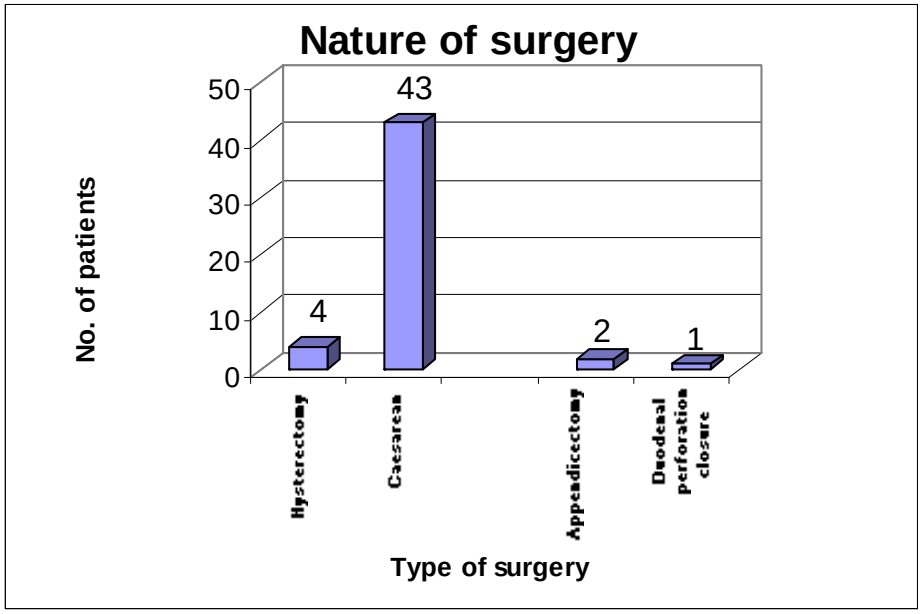


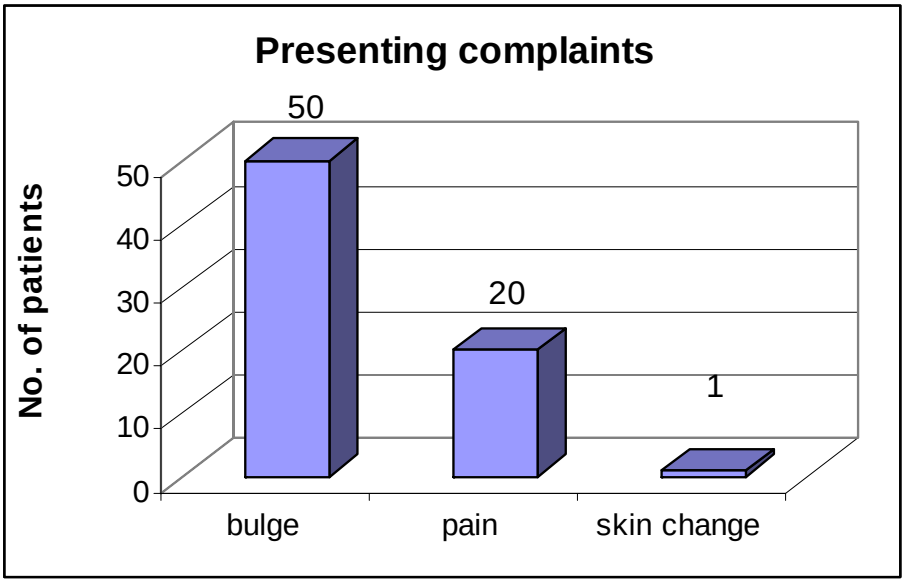

Weight of the patient and occurrence of incisional hernia
16%
32%
52%
40-50 kg
51-60kg
61-70kg

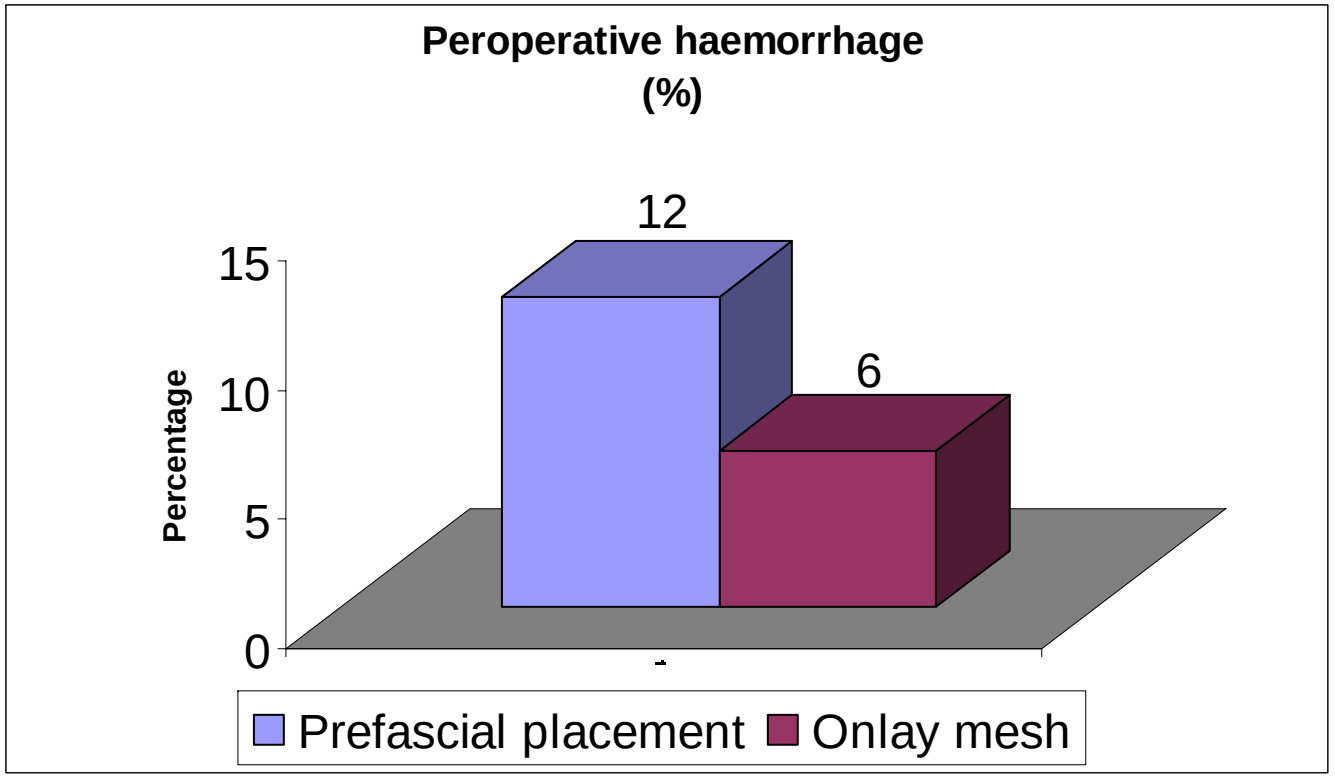

Sex Incidence
6%
94%
Male
Female

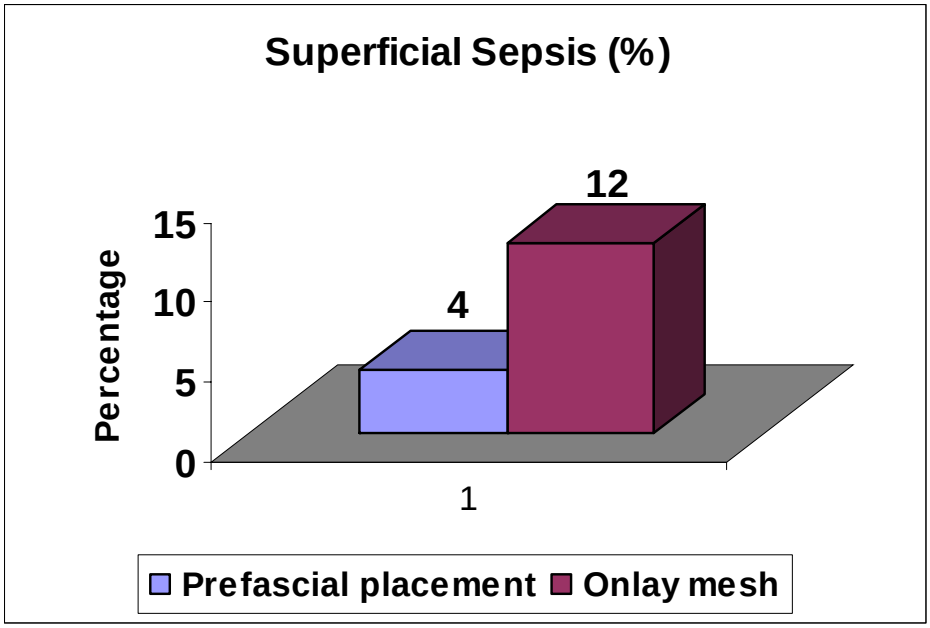

Age Distribution
Percentage
40
35
30
25
20
15
10
5
0
36
30
18
14
2
<20 years
21-30 years
31-40 years
41-50 years
>50 years
Age group

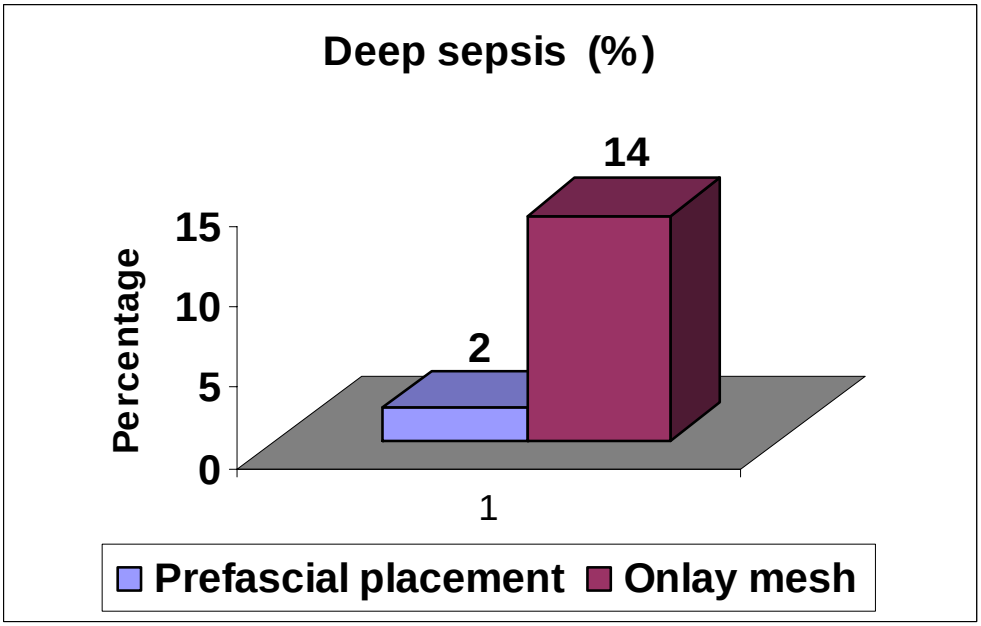

Type of incision
2%
4%
94%
Lower vertical incision
Upper midline
Gridiron


Nature of surgery
No. of patients
50
40
30
20
10
0
43
4
2
1
Hysterectomy
Caesarean
Appendicectomy
Duodenal perforation closure
Type of surgery


Presenting complaints
No. of patients
50
40
30
20
10
0
50
20
1
bulge
pain
skin change


Peroperative haemorrhage
(%)
12
6
15
10
5
0
Percentage
Prefascial placement
Onlay mesh


Superficial Sepsis (%)
Percentage
15
10
5
0
4
12
1
Prefascial placement
Onlay mesh


Deep sepsis (%)
Percentage
15
10
5
0
2
14
1
Prefascial placement
Onlay mesh

MASTER CHART

S.No	Name	Age	Sex	IP No	Wt. Kg	Type of incision	Nature of previous surgery	Associated diseases	Diameter of defect	Procedure done	Peroperative complicaitons	Early post op complications	Late post op complicaitons
1	Asha sevani	40	F	238536	62	L.R.P.M	L.S.C.S		7	Prefascial	Haemorrhage		
2	Subbulakshmi	28	F	243760	41	L.R.P.M	L.S.C.S		4	Prefascial			
3	Durga devi	33	F	282688	46	L.R.P.M	L.S.C.S		3	Onlay		Deep Sepsis	
4	Rakayee	25	F	291566	51	L.R.P.M	L.S.C.S		3	Onlay		Deep Sepsis	
5	Maheswari	25	F	291791	58	L.M	L.S.C.S		4	Prefascial			
6	Pandiammal	25	F	302555	48	L.R.P.M	L.S.C.S		4	Onlay	Haemorrhage	Supf. Sepsis	
7	Muthualagu	70	F	304849	67	L.R.P.M	Hysterecto my	DM with HT	4	Prefascial		Supf. Sepsis	
8	Lakshmi	25	F	308014	53	L.R.P.M	L.S.C.S		4	Onlay			
9	Mayilthal	25	F	309220	47	L.R.P.M	L.S.C.S		3	Onlay		Deep Sepsis	
10	Karupayee	40	F	310274	55	L.R.P.M	L.S.C.S		6	Prefascial	Haemorrhage	Hematoma	
11	Inbarani	48	F	310316	58	L.R.P.M	L.S.C.S		4	Onlay			
12	Saraswathi	50	F	323556	59	L.R.P.M	L.S.C.S	DM	7	Prefascial	Haemorrhage	Ileus	
13	Mariammal	53	F	327662	64	L.M	L.S.C.S	DM	4	Prefascial		Supf. Sepsis	
14	Alageswari	36	F	327873	43	L.R.P.M	L.S.C.S		3	Onlay			
15	Lakshmi	33	F	330964	54	L.R.P.M	L.S.C.S		4	Prefascial			
16	Annamayil	21	F	338006	51	L.R.P.M	L.S.C.S		4	Prefascial			
17	Lakshmi	31	F	345741	49	L.R.P.M	L.S.C.S		3	Onlay		Supf. Sepsis	
18	Solaiammal	29	F	352139	52	L.R.P.M	L.S.C.S		4	Onlay		Supf. Sepsis	
19	Nagalakshmi	28	F	351697	53	L.R.P.M	L.S.C.S		4	Prefascial			
20	Maheswari	37	F	351907	55	L.M	L.S.C.S		5	Prefascial			
21	Gunavathi	27	F	353597	54	L.R.P.M	L.S.C.S		4	Prefascial			
22	Panchavarnam	30	F	356075	41	L.R.P.M	L.S.C.S		3	Onlay			
23	Radha	40	F	358723	50	L.R.P.M	L.S.C.S		4	Onlay		Ileus	
24	Lakshmi	55	F	364795	66	L.R.P.M	Hysterecto my	DM	8	Prefascial	Haemorrhage		
25	Shenbagavalli	37	F	369285	51	L.R.P.M	L.S.C.S		4	Onlay		Supf. Sepsis	

S.No	Name	Age	Sex	IP No	Wt. Kg	Type of incision	Nature of previous surgery	Associated diseases	Diameter of defect	Procedure done	Peroperative complicaitons	Early post op complications	Late post op complicaitons
26	Sundareswari	25	F	373000	58	L.R.P.M	L.S.C.S		4	Prefascial			
27	Mookammal	38	F	376571	52	L.M	L.S.C.S		3	Onlay		Supf. Sepsis	
28	Saraswathi	29	F	386979	42	L.R.P.M	L.S.C.S		3	Onlay			
29	Amsavali	24	F	395216	51	L.R.P.M	L.S.C.S		4	Prefascial			
30	Krishnaveni	49	F	395914	59	L.R.P.M	L.S.C.S	DM	4	Onlay		Deep Sepsis	
31	Parvathy	25	F	398875	48	L.R.P.M	L.S.C.S		4	Onlay			
32	Indiravathy	44	F	398887	58	L.R.P.M	L.S.C.S		6	Prefascial	Haemorrhage		
33	Guruvammal	38	F	400356	56	L.R.P.M	L.S.C.S		3	Onlay			
34	Lakshmi	45	F	402982	49	L.M	L.S.C.S		3	Prefascial			
35	Mariammal	58	F	404425	68	L.R.P.M	L.S.C.S	DM	4	Onlay	Haemorrhage	Deep Sepsis	Recurrence
36	Vijayalakshmi	49	F	404949	56	L.R.P.M	L.S.C.S	DM	4	Prefascial		Deep Sepsis	
37	Jeyanthi	31	F	407208	53	L.R.P.M	L.S.C.S		5	Prefascial			
38	Seerin	24	F	409776	47	L.R.P.M	L.S.C.S		3	Onlay		Supf. Sepsis	
39	Chellathayee	30	F	417185	51	L.M	L.S.C.S		4	Onlay		Deep. Sepsis	
40	Subramani	45	M	418077	65	Gridiron	Appendectomy		4	Onlay			
41	Jothi pandy	24	M	418930	57	Gridiron	Appendectomy		3	Onlay			
42	Maria planeedin	75	F	419317	65	L.R.P.M	L.S.C.S	DM	4	Onlay		R.S problem	
43	Fathima jehara	48	F	418117	53	L.R.P.M	L.S.C.S		4	Onlay		Supf. Sepsis	
44	Ayyavoo	60	M	420664	68	U.M	D.U.Perf.closure		8	Prefascial	Haemorrhage	Ileus	
45	Surya begam	36	F	416484	52	L.R.P.M	L.S.C.S		4	Onlay			
46	Muneeswari devi	45	F	422241	48	L.R.P.M	L.S.C.S	DM	4	Prefascial			
47	Chitra	20	F	426118	44	L.R.P.M	L.S.C.S		3	Onlay			
48	Avadaiammal	61	F	426578	62	L.R.P.M	L.S.C.S		6	Prefascial			
49	Oyyammal	47	F	429198	59	L.R.P.M	L.S.C.S	DM	4	Onlay	Haemorrhage	Deep Sepsis	
50	Pitchaiammal	40	F	426835	47	L.R.P.M	L.S.C.S		4	Onlay			
	L.R.P.M -Lower right paramedian				L.M- Lower midline		U.M.- Upper midline			L.S.C.S- Lower segment caesarean section			
	DM- Diabetes mellitus			HT- Hypertension									